



### 3. B.Sc. (Ag) SECOND YEAR FIRST SEMESTER

#### 3.1 Practical Crop Production - I [AGR 202]

1(0+1)

##### Theory:

Practice of raising 4-5 prevailing kharif crops of the agro-climatic zone will be done by the student. One crop will be grown by a student or group of 2-4 students depending upon the strength of students in the class, on a minimum of 100 m<sup>2</sup> areas. Following practices will be performed by the students for raising the allotted crop to them separately, besides observing the practices performed by the other students in their plots for raising the crops.

##### Practical:

1. Crop planning, raising field crops in multiple cropping systems:
2. Field preparation, seed treatment, nursery raising, sowing, nutrient management, water management, weed management and management of insect pests and diseases of crops, harvesting, threshing, drying, winnowing, storage and marketing of produce.
3. Preparation of balance sheet including cost of cultivation, net returns per student as well as per team of a group of students.

##### References:

1. Hand book of Agriculture – ICAR
2. Krishi Vijay – RVSKVV Publication, Gwalior
3. Krishi Vishwa – JNKVV, Jabalpur
4. Principles and Practices of Agronomy – P. Balasubramaniam & S.P. Palaniappan
5. Principles and Practices of Agronomy – S.S. Singh
6. Crop Management (Under irrigated and rained conditions) – S.S. Singh
7. Principles of Agronomy – T.Y. Reddy and G.H. Sankara Reddy
8. Production Economics and Farm Management – S.P. Dhondyal & G.N. Singh
9. Agricultural Finance & Management – S. Subba Reddy & P. Raghu Ram
10. Cropping System (Theory & Practice) – B.N. Chatterjee & S. Maiti



### 3.2 Principles of Plant Breeding [GPB 201]

3(2+1)

#### Theory:

Classification of plants, Botanical description, Floral biology, Emasculation and Pollination techniques in cereals, millets, pulses, oil seeds, fibers and plantation crops etc. Aims and objectives of Plant Breeding; Modes of reproduction, Sexual, Asexual, Apomixis and their classification; Significance in plant breeding; Modes of pollination, genetic consequences, differences between self and cross pollinated crops; Methods of breeding – introduction and acclimatization. Selection, Mass selection Johannson's pure line theory and its genetic basis, pure line selection; Hybridization, Aims and objectives, types of hybridization; Methods of handling of segregating generations, pedigree method, bulk method, back cross method and various modified methods; Incompatibility and male sterility and their utilization in crop improvement; Heterosis, inbreeding depression, various theories of Heterosis, exploitation of hybrid vigour development of inbred lines, single cross and double cross hybrids; Population improvement programmes, recurrent selection, synthetics and composites; Methods of breeding for vegetatively propagated crops; Clonal selection; Mutation breeding; Ploidy breeding; Wide hybridization, significance in crop improvement.

#### Practical:

1. Botanical description and floral biology;
2. Study of megasporogenesis and microsporogenesis;
3. Fertilization and life cycle of an angiospermic plant; Plant Breeder's kit;
4. Hybridization techniques and precautions to be taken;
5. Floral morphology, selfing, emasculation and crossing techniques;
6. Study of male sterility and incompatibility in field plots; Rice and Sorghum; Maize and Wheat; Bajra and ragi; Sugarcane and coconut; Groundnut, Castor, Safflower and Sesamum; Redgram, Bengalgram and Greengram;
7. Soybean and blackgram; Chillies, Brinjal and Tomato; Bhindi (Lady Finger), Onion, Bottle gourd and Ridge gourd; Cotton and Mesta; Jute and Sunhemp



**References:**

1. Allard RW. (1981). Principles of Plant Breeding. John Wiley & Sons.
2. Chopra VL. (2001). Breeding Field Crops. Oxford & IBH.
3. Gupta SK. (2005). Practical Plant Breeding. Agribions.
4. Pohlman JM & Bothakur DN. (1972). Breeding Asian Field Crops. Oxford & IBH.
5. Roy D. (2003). Plant Breeding, Analysis and Exploitation of Variation. Narosa Publ. House.
6. Sharma JR. (2001). Principles and Practice of Plant Breeding. Tata McGraw-Hill.
7. Simmonds NW. (1990). Principles of Crop Improvement. English Language Book Society.
8. Singh BD. (2006). Plant Breeding. Kalyani.
9. Singh P. (2002). Objective Genetics and Plant Breeding. Kalyani.
10. Singh P. (2006). Essentials of Plant Breeding. Kalyani.
11. Singh S & Pawar IS. (2006). Genetic Bases and Methods of Plant Breeding CBS.

**3.3 Insect Morphology and Systematics [ENT 201]****3(2+1)****Theory:**

History of Entomology in India. Factors for insects abundance. Classification of phylum Arthropoda upto classes. Relationship of class Insecta with other classes of Arthropoda Morphology: Structure and functions of insect cuticle and moulting. Body segmentation Structure of Head, thorax and abdomen. Structure and modifications of insect antennae, mouth parts and legs. Wing venation, modifications and wing coupling apparatus. Structure male and female genitalia. Sensory organs. Metamorphosis and diapause in insects. Types of larvae and pupae. Structure and functions of digestive, circulatory, excretory, respiratory, nervous, secretory (Endocrine) and reproductive system in insects.



Types of reproduction in insects. Systematics: Taxonomy –importance, history and development and binomial nomenclature. Definitions of Biotype, Sub-species, Species, Genus, Family and Order. Classification of class Insecta upto Orders. Orthoptera, Acrididae. Dictyoptera, Mantidae, Odonata, Isoptera, Termitidae, Thysanoptera, Thripidae, Hemiptera, Pentatomidae, Coreidae, Pyrrhocoridae, Lygaeidae, Cicadellidae, Delphacidae, Aphididae, Coccidae, Aleurodidae, Pseudococcidae, Neuroptera, Chrysopidae Lepidoptera, Noctuidae, Sphingidae, Pyralidae, Gelechiidae, Arctiidae, Coleoptera, Coccinellidae, Chrysomelidae, Cerambycidae, Curculionidae, Bruchidae, Scarabaeidae, Hymenoptera, Tenthredinidae, Apidae, Trichogrammatidae, Ichneumonidae, Braconidae, Diptera, Cecidomyiidae, Trypetidae, Tachinidae, Agromyziidae.

**Practical:**

1. Methods of collection and preservation of insects including immature stages;
2. External features of Grasshopper/Blister beetle;
3. Types of insect antennae, mouthparts and legs;
4. Wing venation, types of wings and wing coupling apparatus Types of insect larvae and pupae;
5. Dissection of digestive system in insects (Grassopher);
6. Dissection of male and female reproductive systems in insects (Grassopher);
7. Study of characters of orders Orthoptera, Dictyoptera, Odonata, Isoptera, Thysanoptera, Hemiptera, Lepidoptera, Neuroptera, Coleoptera, Hymenoptera, Diptera and their families of agricultural importances

**References:**

1. Nayar. K.K, Ananthakrishnan.T.N.and David .B.V. (1976). General and Applied Entomology. Mc graw Hill publishing Co. Ltd. NewDelhi.
2. Richards O.W. and Davies R.G. (1977). Imm's General Text Book of Entomology, Vol. I & II. Chapman and Hall, London
3. Pant. N.C. and Ghai. S, (1981). Insect Physiology and Anatomy, ICAR.
4. Chapman .R.F. (1974). Insect Structure and Function, ELBS Publishers New Delhi.
5. Snodgrass.R.E. (2001). Principles of Insect Morphology.





### 3.4 Agricultural Finance and Co-Operation [AEC 201]

2(1+1)

#### Theory:

Agricultural finance: nature and scope. Time value of money, Compounding and Discounting. Agricultural credit: meaning, definition, need, classification. Credit analysis: 4R's 5C's and 7 P's of credit, repayment plans. History of financing agriculture in India. Commercial banks, nationalization of commercial banks. Lead bank scheme, regional rural banks, scale of finance. Higher financing agencies, RBI, NABARD, AFC, Asian Development Bank, World Bank, Insurance and Credit Guarantee Corporation of India. Assessment of crop losses, determination of compensation. Crop insurance, advantages and limitations in application, estimation of crop yields. Agricultural cooperation: philosophy and principles. History of Indian cooperative Movement, pre-independence and post independence periods, cooperation in different plan periods, cooperative credit structure: PACS, FSCS. Reorganisation of cooperative credit structure in Andhra Pradesh and single window system. Successful cooperative systems in Gujarat, Maharashtra. Punjab etc.

#### Practical:

1. Factors governing use of Capital and identification of credit needs;
2. Time value of money, Compounding and discounting;
3. Tools of financial management, Balance sheet, Income statement and cash flow analysis;
4. Estimations of credit needs and determining unit costs;
5. Preparations and analysis of loan proposals;
6. Types of repayment loans; Study of financial institutions: PACS, DCCB, Apex Banks, RRBs, CBs, NABARD.

#### References:

1. W.F. Lee, M.D. Boehlje, A.G. Nelson and W.G. Murray (1998). Agricultural Finance, Kalyani Publishers, New Delhi.
2. R. Muniraj (1987). Farm Finance for Development, Oxford & IBH, New Delhi.



3. S. Subba Reddy and P. Raghu Ram (2000). Agricultural Finance and Management, Oxford & IBH, New Delhi.
4. C.B. Mammoria and R.D. Saxena (1973). Cooperation in India, Kitab Mahal, Allahabad.
5. B.K. Sinha (1969). Co-operatives in India, National Cooperative Union of India, New Delhi.
6. V.E. Patnaik and A.K. Roy (1988). Cooperation and Cooperative Management, Kalyani Publishers, Ludhiana.

### **3.5 Farm Power and Machinery [AEG 201]**

**2 (1+1)**

#### **Theory:**

Farm power in India: sources, I.C engines, working principles, two stroke and four stroke engines, I.C. engine terminology, different systems of I.C. engine. Tractors, Types, Selection of tractor and cost of tractor power. Tillage implements: Primary and Secondary tillage implements, Implements for intercultural operations, seed drills, paddy transplanters, plant protection equipment and harvesting equipment; Equipments for land development and soil conservation.

#### **Practical:**

1. Study of different components of I.C. Engine; Study of working of four stroke engine.
2. Study of working of two stroke engine.
3. Study of M.B. plough, measurement of plough size, different parts, horizontal and vertical suction, determination of line of pull etc.
4. Study of disc plough.
5. Study of seed-cum-fertilizer drills-furrow opener, metering mechanism, and calibration.
6. Study, maintenance and operation of tractor.
7. Learning of tractor driving.
8. Study, maintenance and operation of power tiller.





9. Study of different parts, registration, alignment and operation of mower.
10. Study of different inters cultivation equipment in terms of efficiency, field capacity.
11. Repairs and adjustments and operation of sprayers.
12. Repairs and adjustments and operation of dusters.
13. Study of paddy transplanters.

### References

1. Farm Machinery and Equipment: Nakra C P (1970). Dhanpat Rai & Sons, New Delhi
2. Agricultural Machines: Klenin N I Popov I F and Sakun VA (1985). Amerind Publishing Co. Pvt. Ltd., New Delhi
3. Elements of Agricultural Engineering: Jagadishwar Sahay (1992). Agro Book Agency, Patna
4. Principles of Agricultural Engineering Vol 1: Michael A M and Ojha T P (1993). Jain Brothers, New Delhi
5. Principles of farm machinery: Kepner RA, Roy Bainer and Barger BL (1978). CBS Publishers and Distributors, Delhi-110032
6. Farm machinery – An approach: Jain SC (2003). Standard Publishers Distributors, Delhi-110006

### 3.6 Production Technology of Vegetables and Flowers [HRT 201]

3(2+1)

#### Theory:

Importance of Olericulture, vegetable gardens, vegetable classification. Origin, area, production, varieties, package of practices for fruit vegetables –, tomato, brinjal, chillies, and okra; Cucurbitaceous vegetables- cucumber, ridge gourd, ash gourd, snake gourd, bottle gourd, bitter gourd and melons, Cole crops – cabbage, cauliflower and knol-khol. Bulb crops – onion and garlic. Beans and peas – French beans, cluster beans, dolichos beans, peas and cowpea. Tuber crops – potato, sweet potato, tapioca, colocasia, yams; Root crops – carrot, radish, turnip and beet root; Leafy vegetables – amaranthus, palak, Perennial vegetables – drumstick, coccinia and curry leaf. Importance of ornamental gardens.



Planning of ornamental gardens. Types and styles of ornamental gardens. Use of trees, shrubs, climbers, palms, houseplants and seasonal flowers in the gardens. Package of practices for rose, jasmine, chrysanthemum, crossandra, marigold and tuberose.

**Practical:**

1. Planning and layout of kitchen garden;
2. Identification of important vegetable seeds and plants;
3. Raising of vegetable nurseries;
4. Identification of ornamental plants (trees, shrubs, climbers, house plants, palms etc.,) and development of garden features;
5. Transplanting of vegetable seedlings in main field;
6. Layout of lawns and maintenance;
7. Seed extraction in tomato and brinjal;
8. Depotting, repotting and maintenance of house plants;
9. Visit to commercial vegetable farms;
10. Training and pruning of rose (standards, hybrid 'T' roses, cented roses) and chrysanthemum (pinching and disbudding);
11. Planning and layout of gardens and garden designs for public and private areas;
12. Intercultural operations in vegetable plots;
13. Seed production in vegetable crops;
14. Harvesting indices of different vegetable crops;
15. Grading and packing of vegetables;
16. Prolonging the shelf life of cut flowers

**References:**

1. Vegetable Crops, Thompson H C and Kelly W C (1957). Tata McGraw Hill publishing Co., Ltd, Bombay.
2. Production Technology of Vegetable Crops, Shanmugavelu K G (1985). Oxford & IBH Publishing Co., New Delhi.
3. Commercial Flowers, Bose, T K and Yadav, L P, (1992). Nayaprakash, Calcutta.





4. Floriculture in India, Randhawa G S and Mukhopadhyay, (1994). Allied Publishers, New Delhi.

### **3.7 Livestock Production and Management [LPM 201]**

**3(2+1)**

#### **Theory:**

Place of livestock in the national economy, different livestock development programmes of Govt. of India. Important exotic and Indian breeds of cattle, buffalo, sheep, goat and swine. Measures and factors affecting fertility in livestock, reproductive behaviour like oestrus, parturition, farrowing etc. Milk secretion, milking of animals and factors affecting milk yield and composition. Selection and breeding of livestock for higher milk and meat production Feeding and management of calves, growing heifers and milch animals and other classes and types of animals, housing principles, space requirements for different species of livestock. Disease control measures, sanitation and care, breeding, feeding and production records. Breed characteristics of poultry, their methods of rearing, breeding, feeding and management, incubation, hatching and brooding, vaccination and prevention of diseases, preservation and marketing of eggs, its economics and keeping quality. Cost of production of milk, economical units of cattle, buffalo, sheep, goat and swine.

#### **Practical:**

Identification, handling and restraining of animals; Judging and culling; Feeding and ration formulation; Hatching, housing and management of poultry; Visit to livestock farms and Economics of livestock production.

#### **References:**

1. Livestock Production & Management by Dr. NSR Shastry and Dr, Thomas.
2. Principles and practices of Dairy Farm Management by Dr. Jagdish Prasad & Neeraj
3. Animal Husbandry and Dairy Science by Dr. Jagdish Prasad
4. A Text Book of Animal Husbandry by G.C. Banerjee
5. Poultry Production by Dr. R.A. Singh



6. पशुधन उत्पादन एवं प्रबन्ध- भाठी एवं दाहिमा
7. पशुपालन एवं पशुचिकित्सा विज्ञान- जौहर एवं गुप्ता
8. पशुपालन एवं पशुचिकित्सा विज्ञान- देवनारायण पाण्डेय
9. कुक्कुट पालन/मुर्गी पालन- मासी एवं लवनियां

### 3.8 Organic Farming [AGR 201]

3(2+1)

#### Theory:

Introduction, concept, relevance in present context; Organic production requirements; Biological intensive nutrient management-organic manures, vermicomposting, green manuring, recycling of organic residues, biofertilizers; Soil improvement and amendments; Integrated diseases and pest management – use of biocontrol agents, biopesticides pheromones, trap crops, bird perches; Weed management; Quality considerations, certification, labeling and accreditation processors, marketing, exports.

#### Practical:

1. Raising of vegetable crops organically through nutrient, diseases and pest management;
2. Vermicomposting;
3. Vegetable and ornamental nursery raising;
4. Macro quality analysis, grading, packaging, post harvest management.

#### References:

1. Organic Farming Theory and Practices – Pallaniappan and Annaduman
2. Organic Farming in India – U. Thapa and U.Tripathi
3. A Hand book of Organic Farming- A.K. Sharma
4. A Hand book of Organic Farming and biofertilizers – A.C. Gaur
5. Organic Farming for sustainable Agriculture – Dahama





### 3.9 Crop Physiology [BCH 201]

3(2 + 1)

#### Theory:

Introduction, Importance in Agriculture. Seed Physiology, Seed structures, Morphological, physiological and biochemical changes during seed development, Physiological maturity – Morphological and physiological changes associated with physiological maturity in crop, Harvestable maturity, Seed viability and vigour, Factors affecting seed viability and vigour. Methods of testing seed viability and vigour, Germination, Utilization of seed reserves during seed germination, Morphological, physiological and biochemical changes during seed germination, Factors affecting seed germination. Growth and Development, Definition, Determinate and Indeterminate growth, Monocarpic and Polycarpic species with examples. Measurement of growth, Growth analysis, Growth characteristics, Definitions and mathematical formulae. Crop Water Relations, Physiological importance of water to plants, Water potential and its components, measurement of water status in plants. Transpiration, significance, Transpiration in relation to crop productivity, Water Use Efficiency, WUE in  $C_3$ ,  $C_4$  and CAM plants, Factors affecting WUE. Photosynthesis, Energy synthesis, Significance of  $C_3$ ,  $C_4$  and CAM pathway, Relationship of Photosynthesis and crop productivity, Translocation of assimilates, Phloem loading, apoplastic and symplastic transport of assimilates, Source and sink concept, Photorespiration, Factors affecting Photosynthesis and productivity, Methods of measuring photosynthesis, Photosynthetic efficiency, Dry matter partitioning, Harvest index of crops. Respiration and its significance, Brief account of Growth respiration and maintenance respiration, Alternate respiration – Salt respiration – wound respiration – measurement of respiration. Nutriophysiology – Definition – Mengel's classification of plant nutrients – Physiology of nutrient uptake – Functions of plant nutrients – Deficiency and toxicity symptoms of plant nutrients – Foliar nutrition – Hydroponics. Introduction of Photoperiodism and Vernalisation in relation to crop productivity – Photoperiodism, Plant Growth Regulators – Occurrence – Biosynthesis – Mode of action of Auxins, Gibberellins, Cytokinins, ABA, Ethylene. Novel plant growth regulators, Commercial application of plant growth regulators in agriculture. Senescence and abscission



- Definition - Classification - Theories of mechanism and control of senescence - Physiological and biochemical changes and their significance. Post Harvest Physiology - Seed dormancy - Definition - types of seed dormancy - Advantages and disadvantages of seed dormancy - Causes and remedial measures for breaking seed dormancy, Optimum conditions of seed storage - Factors influencing seed storage (ISTA standards). Fruit ripening - Metamorphic changes - Climateric and non-climateric fruits - Hormonal regulation of fruit ripening (with ethrel, CCC, Polaris, paclobuterozole ).

**Practical:**

1. Preparation of solutions;
2. Growth analysis: Calculation of growth parameters;
3. Methods of measuring water status in roots, stems and leaves;
4. Measurement of water potential by Chardakov's method;
5. Measurement of absorption spectrum of chloroplastic pigments and fluorescence;
6. Measurement of leaf area by various methods;
7. Stomatal frequency and index - Respirometer - Measurement of rate of respiration;
8. Leaf anatomy of  $C_3$  and  $C_4$  plants;
9. Measurement of Transpiration;
10. Imbibition of seed;
11. Optimum conditions for seed germination;
12. Breaking seed dormancy; (a) Chemical method (b) Mechanical method;
13. Yield analysis;
14. Seed viability and vigour tests;
15. Effect of ethylene on regulation of stomatal closing & opening.

**References:**

1. Text Book of Plant Physiology by C.P. Malik and A.K. Shrivastava, Kalyani Publishers.





2. Plant Physiology by Salisbury and Ross, CBS (Latest Indian Edition).
3. Plant Physiology by S.N. Pandey and B.K. Sinha. Vikas Publishing House Pvt. Ltd.
4. Advanced in Plant Physiology (Vol.-12) by A. Hemantaranjan. Scientific Publishers.
5. Plant Physiology by L. Taiz and E. Zeiger. Panama Publishing Corporation.
6. Physiology of Crop Plants by Franklin. P. Gardner, R. Brent Pearce, Roger. L. Mitchell. Scientific Publishers.

### 3.10 Human Values and Professional Ethics - I (HVPE-I) [EXT211] 3 (1+2)

#### Module 1:- Introduction to value addition

Understanding the need, basic guidelines, content and process for value Education. Self exploration:- its content and process, Natural Acceptance and Experiential Validation as the mechanism for self-exploration. Continuous happiness and prosperity: A look at basic human aspirations, Right understanding, and Relationship and physical facilities: The basic requirements, for fulfillment of aspiration of every human being understanding, Happiness and Prosperity correctly: A critical appraisal of the current scenario. Methods to fulfill the above human aspirations: understanding and living in harmony at various levels.

#### Module 2: Harmony in the human Being

Understanding human being as a co-existence of the sentient 'I' and the material 'Body' understanding the needs of self (I) and Body: *Sukh and suvidha*, understanding the Body as an instrument of I: (I being the doer, sees and enjoyer) understanding the characteristics and activities of 'I' and harmony in 'I'; understanding the harmony of 'I' with the body: *Sanyam* and *Swasthya*. Correct appraisal of physical needs, meaning of prosperity in detail, program to ensure *Sanyam*, and *Swasthya*.

#### Module 3: harmony in the family:

Understanding harmony in the family: the basic unit of human interaction; Understanding value in human -human relationship: meaning of *Nayayand* programme for its fulfillment to ensure *Ubhay-tripli* Trust (*Vishwas*) and Respect





(Samman) as the foundational values of relationship; Understanding the meaning of Samman: Difference between respect and differentiation the other salient values in relationship.

**Practical:**

**Exercise 1:** Introduce yourself in detail, what are the goals in your life? How do you set your goals in your life? How do you differentiate between right and wrong? What have been your salient achievements and shortcomings in your life?

**Exercise 2:** Now a day there is a lot of talk about many techno-maladies such as energy and material resource depletion environmental pollution, global warring. Ozone depletion, deforestation, soil degradation etc. All these seem to man-made problems threatening the survival of life on Earth-what is the root cause of these maladies and what is the way out in your opinion?

**Exercise 3:** on the other hand. There is rapidly growing danger because of nuclear proliferation, arms race, terrorism criminalization of politics, large scale corruption scams breakdown of relationship, generalization gap, depression and suicidal attempts at etc. but think is the root cause of these threats to human happens and place- what could be the way out in your opinions?

**Exercise 4:** Observe that each one of you us has the faculty of natural acceptance based on which one can verify but is right or not right for him (as such we are not properly trained to listen to our nature acceptance and many a time it is also clouded by our strong per conditioning and sensory attraction) EXPLORE: 1 what is natural Acceptable to you in relationship the felling of respect or disrespect for your self and for others? 2) What is natural Acceptable to you to nature or to exploit others? 3) it you leaving in accordance with your natural expectance or different it? Out of these basic requirements for fulfillments of your aspiration right underrating relationship & physical facility observed how the problems in your family are related to each. Also observe how much time and effort you devote for each in your daily routine.

**Exercise 5:** List down all your importance desire. Observe whether the desire is related to self (I) or body. If appears to be related to body or both





visualize which part of it is related to self (I) and which part is related to Body.

**Exercise 6:** Observe any physical facility you use follows the given sequence with time: necessary and tasteful unnecessary but still testful- Unnesessary and testless into lerable. b) In contrast, observe that any feeling in you is either naturally acceptable or not acceptable at all. If naturally acceptable, you want continuously and if not acceptable, you do not want any moment.

**Exercise 7:**

List

**Exercise 8:**

Obs

**Exercise 9:**

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**Exercise 10: Film/ Documentary shows:** Selected items from internet and/ or DVDs followed by through discussion.

#### The text Book:-

1. RR. Gaur, R. Sangal, GP Bagaria, (2009). A foundation course in human values and professional ethics, Excel Books, New Delhi.

#### References Book:

1. Ivan Illich, (1974). Energy and equity, the trinity press, Worcester, and Harper Collins, USA.
2. E.F. Schunacher, (1973). Small is beautiful: A study of economics as if people mattered, blond Briggs, Britian.
3. Sussan George, (1976). How the other half dies, penguin press, reprinted (1986, 1991).
4. Donella H, Meadows, Dennis L, Jorgen Randers, William W, Behrens III, (1972). Limits to growth-club of Rome report universe books.
5. Anagraj, (1998). jeevan Vidyaekparichay, Divya path sansthan, Amarkanthak.
6. P.L. Dhar, RR. Gaur, (1999). Science & humanism, commonwealth publishers.
7. A.N. Tripathi, (2003). Human values, new age international publisher.



8. Subhash Palekar, (2000). How to practice natural farming, Pracheen (Vaidik), krishi Tantra Shodh, Amarawati.
9. E.G. Seebauer and Robert L. berry, (2000). Fundamentals of ethics for scientist and engineers, Oxford University press.
10. M. Govindrajran, S. natrajan and V.S. Senthil kumar, engineering ethics (including human values), eastern economy edition, prentice Hall of India Ltd.
11. B.P. bannerjee, (2005). Foundation of Ethics and management, Excel Books.
12. B.L. Bajpai, (2004). Indian Ethor and modern management, New Royal book co. Lucknow, Reprinted (2008).